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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/711,678

09/30/2004

Chang-Hu Tsai

13605-US-PA

5677

31561

7590

02/09/2006

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER

NGUYEN, HA T

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/711,678

Applicant(s)

TSAI ET AL.

Examiner

Ha T. Nguyen

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: ____.

DETAILED ACTION***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(a) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-7 and 13-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa (USPN 6613686, hereinafter "Nishizawa").

Referring to Figs. 1(a)-1(f) and related text, Nishizawa discloses [Re claims 1-2] a patterning method, comprising: providing a substrate having a film formed over thereon (see col. 4, line 59-col. 5, line 25); patterning a photoresist layer (see col. 7, lines 45-48), it is inherent that the steps of forming a photoresist layer over the film; exposing and developing the photoresist layer are performed; and etching the film using the patterned photoresist layer as an etching mask at a temperature range of about -50°C to about 50°C; wherein the temperature range is between about -30°C and about 30°C (see col. 7, lines 49-55). But it fails to disclose all the features in the same process. However, it would have been obvious for an ordinary artisan to use all the features as needed in a specific application to obtain the desired features.

[Re claim 3] Nishizawa does not disclose expressly wherein the temperature range is controlled via a susceptor positioned below the substrate. However, the examiner takes Official Notice that this is conventionally done in the art to better control the substrate temperature.

[Re claim 4] Nishizawa also discloses wherein the etching process comprises an anisotropic plasma etching process; [Re claim 5] wherein the anisotropic plasma etching process is performed by directing an ionized plasma via a field; [Re claim 6] wherein the ionized plasma is formed by ionizing a plasma source comprising at least one inert gas selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr) and xenon (Xe); [Re claim 7] wherein a flow rate of the ionized plasma is in a range of about 20sccm to about 200sccm (see col. 6, lines 8-32 and Tables 1-2).

[Re claim 13] Nishizawa does not disclose expressly wherein a thickness of the patterned photoresist layer is in a range of about 200nm to about 500nm and [Re claim 14] wherein the photoresist layer comprises a positive photoresist layer or a negative photoresist layer. However any variation in resist thickness in the present claims is obvious in light of the cited art, because the changes in thickness produce no unexpected function. *The routine varying of parameters to produce expected changes are within the ability of one of ordinary skill in the art. Patentability over the prior art will only occur if the parameter variation produces an unexpected result. In re Aller, Lacey and Hall, 105 U.S.P.Q. 233, 235. In re Reese 129 U.S.P.Q. 402, 406.* Besides, both positive and negative resist are well known in the art, the use of either one depends on the flow of the process and the feature to be etched.

[Re claims 15-18] Nishizawa also discloses wherein the film comprises a single layer or multiple layers; wherein the film comprises a dielectric layer, an inter-metal dielectric (IMD) layer or an inter-layer dielectric (ILD) layer; wherein the film comprises an oxide layer, a nitride layer, a poly-silicon layer or a single crystal silicon layer; wherein the patterning method is performed to form a trench structure, a contact structure or a via structure in the film (see Fig. 1a).

[Re claim 19] Nishizawa fails to expressly disclose wherein the trench structure comprises a shallow trench isolation (STI) structure. However, this would have been obvious to an ordinary artisan to use the same process to form a STI when an isolation feature is formed instead of a contact.

Therefore, it would have been obvious to use Nishizawa's teaching to obtain the invention as specified in claims 1-7 and 13-19.

3. Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa, as applied above, and in view of Autryve (USPN5935877).

Nishizawa discloses substantially the limitations of claims 8-12, as shown above. It also discloses [Re claim 9 wherein the external plasma source comprises $\text{CF}_4:\text{CHF}_3$, $\text{CF}_4:\text{CH}_2\text{F}_2$, $\text{C}_2\text{F}_6:\text{CHF}_3$ or $\text{C}_2\text{F}_6:\text{CH}_2\text{F}_2$; [Re claim 10 wherein a gas flow ratio of CF_4 to CHF_3 of the $\text{CF}_4:\text{CHF}_3$, a gas flow ratio of CF_4 to CH_2F_2 of the $\text{CF}_4:\text{CH}_2\text{F}_2$, a gas flow ratio of C_2F_6 to CHF_3 of the $\text{C}_2\text{F}_6:\text{CHF}_3$, or a gas flow ratio of C_2F_6 to CHF_3 of the $\text{C}_2\text{F}_6:\text{CHF}_3$ is larger than 1 (see col. 5, line 31-37 and Table 1).

But it fails to disclose expressly [Re claim 8] wherein the plasma source further comprises an external plasma source; [Re claim 11] wherein the field comprises an electric field or a magnetic field; [Re claim 12] wherein a power applied at one electrode for generating the electric field is in a range of about 150W to about 300W.

However, the missing limitations are well known in the art because Autryve discloses these features (See col. 6, lines 43-53 and col. 7, lines 12-39). In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F. 2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F. 2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990)

A person of ordinary skill is motivated to modify Nishizawa with Autryve to obtain controlled gas flow and etch rate.

Therefore, it would have been obvious to combine Nishizawa with Autryve to obtain the invention as specified in claims 8-12.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha T. Nguyen whose telephone number is (571) 272-1678. The

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examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week. The telephone number for Wednesday is (703) 560-0528.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt, can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



HN

02- 03 -06

Ha Nguyen

Primary Examiner